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COMMITTEE OF EXPERTS ON THE
TRANSPORT OF DANGEROUS GOODS

Sub-Committee of Experts on the
Transport of Dangerous Goods
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agenda item 6)

EXPLOSIVES (CLASS 1)

Additional Test for 1.4 and 1.4 S Classification
Evalutation of properties in the definition not currently tested

Transmitted by the Expert from Canada

INTRODUCTION

1. At present the classification of articles and substances into 1.4 Compatibility Group S relies solely on the results of the 6(c) Test. However, the definition for 1.4 and 1.4 S includes requirements which are not determined by the 6(c) Test.

2. The definitions for 1.4 and 1.4 S classifications are as follows:

Paragraph 2.1.1.4 (d) of Recommendations on the Transport of Dangerous Goods Model Regulations", tenth revised edition, page 42:

"Division 1.4 *Substances and articles which present no significant hazard*

"This division comprises substances and articles which present only a small hazard in the event of ignition or initiation during transport. The effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire shall not cause virtually instantaneous explosion of almost the entire contents of the package.

"Note: Substances and articles of this division are in Compatibility Group S if they are so packaged or designed that any hazardous effects arising from accidental functioning are confined within the package unless the package has been degraded by fire, in which case all blast and projection effects are limited to the extent that they do not significantly hinder fire-fighting or other emergency response efforts in the immediate vicinity of the package."

3. The Manual of Tests and Criteria provides various regimes for testing products as candidates for Class 1: Series 1 to 4 define acceptability into Class 1. Series 5 defines acceptability into 1.1 or 1.5. Series 6 defines acceptability into 1.1, 1.2, 1.3, 1.4 or 1.4 S.

4. The 6(a) and 6(b) tests look into the possibility of mass explosion, communication leading to mass explosion and thus classification into 1.1.

5. The 6(c) test classifies into 1.1, 1.2, 1.3, 1.4, and 1.4 S. However it does so by virtue of behavior in a fire. That is, the test looks at behavior of the substance or articles after its package has been degraded by fire.

6. The part of the definition for 1.4 S, "any hazardous effects arising from accidental functioning are confined within the package", this not addressed. The substance or articles are not initiated or ignited in a manner that could determine effects outside the package if the substance or article functioned as intended. There is a possibility that products classified as 1.4 S based on behaviour in a fire may produce a hazardous effect when functioned. Examples are small amounts of detonating explosive which will burn in a fire but would detonate if initiated and would possibly produce hazardous effects outside the package.

7. Initiation or ignition as a result of fire, after the package is degraded, may produce different results from functioning with the intended means of ignition or initiation. Knowledge of the behaviour of the article or substance in both cases is needed to allow proper classification.

8. The definition of 1.4 criteria stipulates that "in the event of ignition or initiation during transport. The effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected". The 6(c) Test tests for accidental ignition by fire. No test is used to determine how well the effects are confined to the packaged or largely confined to the package when ignited or initiated.

PROPOSAL

8. Canada proposes that a new test, the 6(d) be added to determine those requirements for which there is no current test. The 6 (a) test can serve as a basis for this test to determine effects outside the package in the case of ignition during transport. The 6(a) test would be repeated but without any confinement. After completing the test series 6(a), 6(b) and 6(c), 6(d) would be conducted.

10. The product in question would be initiated in the same manner as prescribed in Test Series 6(a). Items provided with their own means of initiation would use those means unless it is impractical or unsafe to do so. For such a case a remote activating initiation system should be prepared to remove testing personnel from the vicinity of any effect. If the item did not include its own means of initiation, the intended means of initiation should be used.

11. The 1.4 definition calls for "effects largely confined to the package and no projection of appreciable size or range is to be expected". In this case and because the definition uses qualitative terms, Canada proposes to base the criteria on those same criteria either currently accepted for the 6(c) Test or those proposed by the Working Group for the 6(c) Test in Washington.

11.1 For projection criteria 1.4 energy level agreed to during the Working Group in Washington would be used, that is no fragments over 20 J. This is to be measured as in the 6(c) test by no perforation of the aluminum witness screens placed at 4 m from the package.

11.2 The fragment distribution as currently set out in the Manual of Tests and Criteria would be retained: not more than 10 metallic projection, each with a mass exceeding 25 g are thrown more than 50 m from the package; no metallic projection with a mass exceeding 150 g is thrown more than 15 m from the package.

11.3. For the other requirements the criteria which were agreed to during the Working Group in Washington are proposed:

- no fireball or jet of flame beyond 4 m;
- no fiery projection thrown further than 15 m
- a burning time of less than 33 s[illegible]d for 100 kg net explosives weight with the appropriate scaling and measurement factors.

12 Such criteria would be in line with current 1.4 other than Compatibility Group S classifications.

13. The definition of a 1.4 S article or substance requires that any hazardous effects be *confined to inside* the package: the package cannot be perforated (projections are confined); the package must not allow flames to come through (thermal effects are confined to inside the package) and the package must remain intact (blast effects are confined to within the package). This can be evaluated visually after the event and with videos for the flames. The setting of these criteria is based on the definitions: the effects must be confined.

EFFECT

14. The criteria selected for the 1.4, other than compatibility group S, are consistent with current numbers and should have little impact on classification.

15. The proposed criteria for a 1.4 S, specifically that hazardous effects be confined to the package, may have some effect on classification because this requirement was never tested. However, we would like to point out that this proposal does not suggest that hazardous effects are to be eliminated but only that they be confined to the package. If articles or substances already classified fail to meet this proposed test, they also fail to meet the definitions for 1.4 S and are not properly classified. *The solution is not to change criteria to allow these substances or articles into this classification but to change the packaging so that they do meet the intentions of the definition.*

16. It must be pointed out that though such a test was never a requirement, Competent Authorities did have the option of using such a test in support of their decisions. The inclusion of such a est in the prescribed test regime will allow for more consistent uniformity in classification.